Photo courtesy of the U.S. Coast Guard

R-TECH™ NEWSLETTER
The Newsletter of the First Responder Technologies Program

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STADIUM SIMULATOR

Software Allows First Responders to Play Out Worst Case Scenarios

Large, crowded structures are enormously difficult to evacuate. A common example of such a structure is a stadium, which crams thousands of excited spectators side by side. While many sports stadiums have increased security and developed evacuation plans in recent years, it remains difficult to prepare and train for the variety of emergency events that might occur. First responders working to safely evacuate spectators and personnel from a stadium face a wide array of challenges particular to those environments. To help overcome these challenges, new simulation software is being developed that will give emergency managers and first responders the chance to train and prepare for a large-scale evacuation of a stadium.

The Sport Safety and Security Evacuation Package is in development at the University of Southern Mississippi National Center for Spectator Sports Safety and Security (NCS[4]), a research institution supported by the Department of Homeland Security (DHS) Southeast Region Research Initiative (SERRI) program. The simulation is part of a broader stadium security training package called SportEVac. The idea for training of security personnel in sports stadiums began to evolve five years ago when NCS[4] examined research that indicated important gaps in training and exercising emergency plans in stadiums at colleges and universities. The center, in collaboration with Oak Ridge National Laboratory, Regal Decision Systems, NVision, and the U.S. Army Engineer Research and Development Center, began to search for a way for first responders to bridge those gaps by practicing scenarios located at stadium events of all varieties and locations.

"[SportEVac] will bring in a number of pieces of the [evacuation] puzzle in order to provide a powerful tool to first responders," said Mike Matthews, program manager at the DHS Science and Technology Directorate (S&T) Infrastructure and Geophysical Division. The tool suite, complete with an Evacuation Planning Tool (EPT) for simulations, will enable security personnel, law enforcement, and emergency response teams to run a variety of scenarios to determine how to best get people out of a given stadium. The package offered through the SportEVac program also will increase cooperation between local first responders and stadium security personnel by allowing them to work through tabletop exercises side by side to prepare and assign roles for potential events.

Through the SportEVac program, first responders will be able to enter a customized virtual model based upon the blueprints of their home stadium. There they will encounter spectators, other first responders, threats, and other avatars in a pre-determined evacuation scenario, according to Joseph Borkoski, president of the software services firm Regal Decision Systems. The scenarios could include weather events, such as lightning storms,

In the SportEVac simulation and training package, thousands of avatars are in motion at once, realistically representing the chaotic mix of sports fans, security staff, first responders, and vehicles that interact during a stadium evacuation. Image courtesy of Southeast Region Research Initiative.

Stadium Simulator (continued)

and terrorist attacks. The goal is to provide end users with their own training tool suite for any stadium in the United States, or potentially the world. Users can also customize the SportEVac virtual stadiums to reflect the typical crowd size at a given event and can even take into account factors such as the average number of tailgaters outside of stadium events.

Marine Safety Office Pittsburgh enforces a security zone in front of Heinz Field during the Three Rivers Regatta in Pittsburgh, Penn. SportEVac, a new training package, will allow first responders to practice evacuating a large stadium like this one. Photo courtesy of the U.S. Coast Guard.

The SportEVac developers have involved first responders and stadium security personnel in all phases of development to make the tabletops as realistic as possible and, therefore, as useful as possible in training, according to the project's lead investigator, Louis Marciani of NCS[4]. The program will allow first responders and stadium security personnel to work together to practice responding to a multitude of situations around stadiums and the various actions that might be required, such as resource allocation and management; local, statewide, and regional evacuation; and all-hazard and sheltered evacuations.

Michael Tobia, a New York City law enforcement veteran who now works with the DHS S&T Office of University Programs, has been involved with the project since first hearing about the idea from Matthews and New Meadowlands Stadium Director Dan DeLorenzi.

The SportEVac training and simulation package would help first responders practice evacuating crowded stadiums such as Dolphins Stadium in Miami. Photo courtesy of the U.S. Coast Guard.

Tobia hopes that by working with state and local first responders, the researchers and developers will bridge existing gaps between the public and private sector to achieve a common goal: stadium security. According to Tobia, SportEVac will not only provide a useful visual element that current training methods lack, "it will also lead to better security preparation by improving the working relationship between first responders and the private sector in protecting critical infrastructure," he said.

SportEVac is in the alpha stage, meaning that the product is still in development and the team is continuing to gather input from first responders to determine which factors to include in the software. By August 2010, NCS[4] plans to complete a beta test, in which they will turn the system over to first responders for them to use and provide feedback. Because the software will be an open design, there are few limitations to the types of scenarios that first responders can face in the simulation. The tool suite included in the software will work with new coding to increase the software's capabilities and allow for user updates to the evacuation simulation.

Three pilot tests also are scheduled for the fall at the University of Southern Mississippi, the University of Tennessee, and the United States Military Academy at West Point.

For more information, visit www.NCS4.com.

COOL DOWN

Breathing Apparatus Design Aims to Reduce Heat Stress for Firefighters

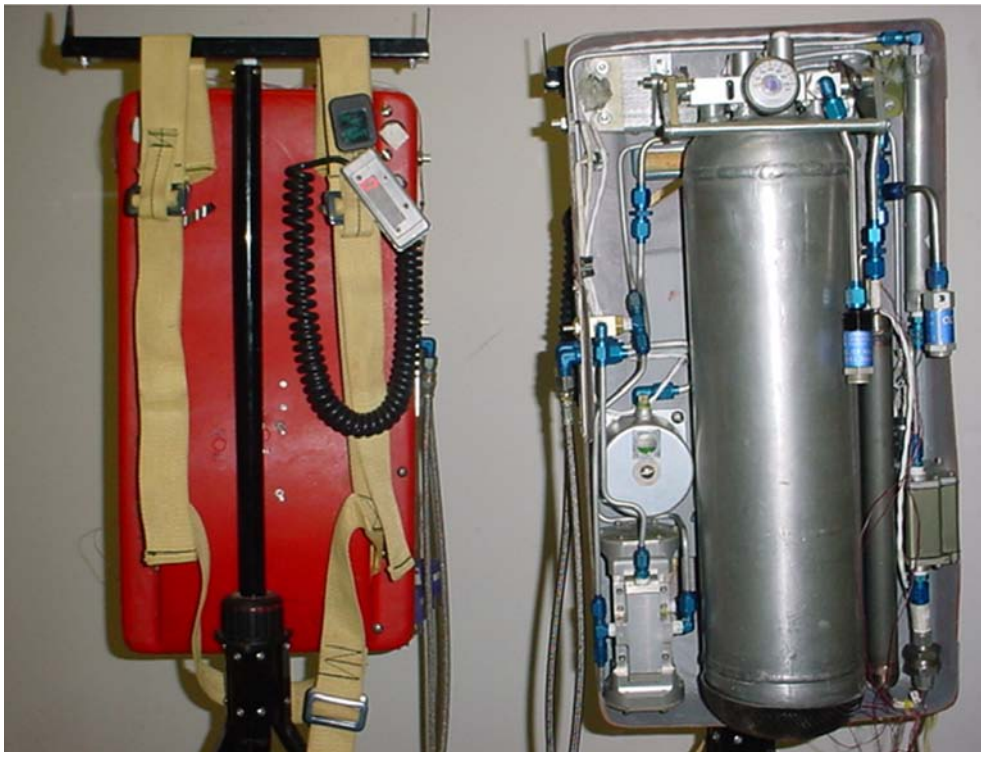
Year after year, overexertion is the leading cause of fatal injury to on-duty firefighters. Firefighters haul equipment and remove debris in searing temperature conditions. Turnout gear can trap heat inside, placing additional strain on firefighters. More than 50 firefighter deaths were linked to stress or overexertion in 2008, according to a September 2009 report by the United States Fire Administration. To help keep first responders cool while they work, several Colorado researchers developed a prototype of a new breathing apparatus called the SuperCritical Air Mobility Pack (SCAMP).

SCAMP is filled with air cooled to -300 degrees Fahrenheit, and the device acts like a giant ice cube attached to the firefighter's back, according to Thomas Bradley, an assistant professor at Colorado State University's Department of Mechanical Engineering. The Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) awarded Colorado State University and Niwot Technologies, LLC a grant for the project in August 2009.

The National Aeronautics and Space Administration (NASA) financed early research into the technology for use by rescue crews at space shuttle launches. Colorado State University is improving that design's endurance and cooling capability and adapting it to meet commercial standards for firefighting equipment, according to Bradley.

Firefighters wear insulating gear that can elevate body temperatures, according to William R. Mora, a retired San Antonio Fire Department captain who wrote a study on firefighter disorientation and has seen the SCAMP technology demonstrated. SCAMP can keep first responders cool underneath layers of protective equipment. "Since skin is not able to breathe [in insulating gear], it results in heavy perspiration, which may result in as much as a 7-pound loss in water weight," Mora said.

SCAMP is smaller than a conventional self-contained breathing apparatus (SCBA) because it is filled with supercooled air that is part liquid and part gas, according to Terry Gier, manager of Niwot Technologies, LLC. At such low temperatures, the air partially liquefies and takes up less space. The transfer of heat from the wearer to SCAMP gradually warms the air inside the tanks until it reaches breathing temperature. A one-hour SCAMP air bottle is about 5 inches in diameter, which is about half the size of a conventional 30-minute air bottle. The apparatus is 5.5 inches deep.



The SuperCritical Air Mobility Pack keeps firefighters and hazmat workers cool with -300 degrees Fahrenheit air. Photo courtesy of Niwot Technologies, LLC.

The full SCAMP apparatus weighs 28 pounds when charged, including 6.5 pounds of breathable air. By comparison, current charged SCBA units can weigh up to 35 pounds, and firefighters often have to carry another 10 to 15 pounds of cooling equipment.

The effort to develop smaller, lightweight SCBA designs for first

Cool Down (continued)

responders is a significant focus at DHS. Another approach has been taken by the DHS Science and Technology Directorate First Responder Technologies (R-Tech) program, which awarded a contract to the International Association of Fire Fighters to develop the Cylinder Array, a next-generation SCBA. Its design replaces hard, metal-based cylinders with thinner pressure vessels protected by a soft, durable, fire-resistant cover. The 7.8-pound Cylinder Array has multiple interconnected smaller vessels of compressed air and provides 45 minutes of breathing air. The apparatus is about 2.25 inches deep in profile, which is flatter than the current equipment's profile of about 11 inches. The thinner, flexible model will help prevent firefighters from becoming entangled in debris. The technology also will significantly reduce the weight of a firefighter's gear, lessening stress and fatigue.

The developers of SCAMP want to achieve similar goals and plan to extend the technology to hazmat crews, which spend long periods working in bulky personal protective gear. "SCAMP [provides] the encapsulated hazmat technician with body cooling capability and a longer duration in breathing capability," said Mora. The researchers are developing a version of SCAMP that would provide hazmat crews with enough air to last four hours, according to Bradley.

Niwot Technologies plans to provide four SCAMP prototypes to FEMA by 2011, according to Gier. Colorado State University is scheduled to run physiological experiments in the summer of 2010 to measure how much heat the body produces while working, both in street clothes and in protective gear. The experiment also will monitor whether SCAMP helps the body cope with exertion in high temperature environments.

The Poudre Fire Authority, which serves a 235-square-mile area in and around Fort Collins, Colo., will test the technology and provide input on the design in 2011. The research has great potential to reduce the heat stress that can wear down firefighters, according to Capt. Patrick Love of the Poudre Fire Authority. "It equates to potentially saving firefighters' lives while making our jobs more efficient," he said.

The prototype must have National Institute for Occupational Safety and Health (NIOSH) approval before it can be sold. Niwot Technologies also plans to have the SCAMP tested for National Fire Protection Association certification as well as for NIOSH chemical, biological, radiological, and nuclear protection requirements. For more information, visit www.news.colostate.edu/Release/4842.

Terry Gier, manager of Niwot Technologies, LLC, shows the SuperCritical Air Mobility Pack breathing apparatus to Colorado State University students. Photo courtesy of Colorado State University.

TREASURE TROVE OF INFORMATION

Digital Library Researchers Compile Homeland Security Policy Documents

Emergency responders might find it easier to draft preparedness plans for their communities if they could see how other response agencies have accomplished the task. One way they can get this information is by researching policy and strategy documents from federal, tribal, state, and local agencies contained within the Homeland Security Digital Library (HSDL), located at www.hsdl.org. Managed by the Center for Homeland Defense and Security (CHDS) at the Naval Postgraduate School (NPS), the HSDL is a digital collection of homeland security documents.

The Homeland Security Digital Library focuses on highlighting and gathering policy documents first responders and homeland security officials can use for research. Image courtesy of the Naval Postgraduate School.

HSDL contains nearly 70,000 documents from government agencies, non-profit organizations, international governing bodies, professional associations, and academic institutions. This online collection of policy documents, lessons learned reports, and other materials offers first responders insight into the work of various agencies and an opportunity to learn best practices.

CHDS, which offers advanced degree programs geared toward members of the military and first responders, partnered with the Department of Justice in 2002 to create the HSDL. The HSDL served as an integral resource for students studying strategy and policy, according to Jodi Stiles, director of information services for CHDS. The HSDL has grown over the years to encompass homeland security documents and resources for first responders and policymakers alike. The Department of Homeland Security (DHS) National Preparedness Directorate funds CHDS as well as the HSDL.

HSDL staff members rely on blogs, e-mail blasts, and other online communication tools to inform emergency responders about the most recent and crucial homeland security publications. Librarians validate the information and ensure it comes from reputable sources, according to Stiles. To spread awareness about its content, the HSDL publishes an e-mail announcement twice a month called *Critical Releases in Homeland Security*. The e-mail, which highlights five or six key documents, has been published for two years and has more than 16,000 subscribers. HSDL account holders can subscribe to the free e-mail alert by logging in at www.hsdl.org/?collection/cr.

For first responders and others who want to be notified when the latest homeland security publications are available, the HSDL also hosts a blog and started a Twitter account in 2009 that announces when documents are published. The HSDL created these resources to help first responders and homeland security officials maintain awareness without investing a lot of time conducting Internet searches. "We deal with a community that is very busy, and we've become a source of information they can trust," Stiles said.

Treasure Trove (continued)

The convenience of the information gathering tools convinced Inspector Richard E. Hunton Jr., executive assistant director of South Carolina Law Enforcement Division, to register for HSDL e-mail alerts. "The e-mail notification tool is extremely helpful and saves me the time of having to manually and constantly search for the latest information in several areas of interest," he said. To help first responders quickly locate the information they need, the library organizes materials by topic, such as infrastructure protection, technology issues, and terrorism and threats.

The HSDL collection differs from the other online homeland security resources funded by DHS, said Greta Marlatt, content manager for the HSDL and an NPS librarian. The HSDL did not want to duplicate the resources other DHS Websites offer, such as the Responder Knowledge Base, which focuses on providing information on equipment, certifications, and grants, or FirstResponder.gov, which provides links to federal resources for the first responder community.

Instead, the HSDL focuses on highlighting and gathering policy documents first responders and homeland security officials can use for research. On the Website, HSDL librarians highlight documents such as NPS student theses, presidential directives, research reports, and significant political speeches, according to Marlatt. The library's collection consists primarily of open source documents, rather than commercially available materials such as books and journal articles. The HSDL provides links to these resources in other libraries.

The library's resources were invaluable to Los Angeles Fire Department Capt. Alicia Welch when she served on a regional catastrophic planning taskforce, which included representatives of 23 different agencies in Los Angeles County. The taskforce needed to develop mass evacuation plans for the region. As part of the research process, Welch turned to the HSDL collection of preparedness plans written by various states and municipalities. Welch is an NPS graduate who is currently a senior fellow/practitioner at the Federal Emergency Management Agency (FEMA) as part of a one-year fellowship provided through CHDS-NPS.

In addition, the HSDL provides reports to help managers of emergency response agencies learn about policy and strategy, according to Marlatt. The library's resources help managers ensure they comply with new homeland security policies and make the most of department resources.

Library users must undergo a vetting process to gain access to the library. Eligible to apply for an individual account are U.S. citizens who are federal, tribal, state or local government officials; members of the military; homeland security researchers and academics; or security staff protecting organizations vital to national infrastructure. Some government agencies, research institutions, and military installations offer institution-wide access to the HSDL.

Having library materials available online makes the collection accessible to a diverse group of first responders nationwide, according to Vincent J. Doherty, a retired New York Fire Department captain who is director of program outreach for CHDS-NPS. "It brings everything from the homeland security field right to your fingertips on your computer at your desk," Doherty said.

For more information, visit the HSDL at www.hsdl.org, www.nps.edu, and www.chds.us.

BY THE NUMBERS

- **19,000** Average number of monthly visitors to the HSDL
- **540** Federal, tribal, state, and local agencies with access to the HSDL
- **16,000** Subscribers to *Critical Releases in Homeland Security* e-mail alerts
- **70,000** Documents in the HSDL collection

Courtesy of Homeland Security Digital Library

RESPONDER KNOWLEDGE BASE

Grants Calendar Added to RKB

The most common request the Responder Knowledge Base (RKB) receives from its users is to simplify and improve the Website's display of grants. Specifically, users have asked that grants be organized by application due date. In response, RKB, located at www.rkb.us, added a new grants calendar feature in May 2010.

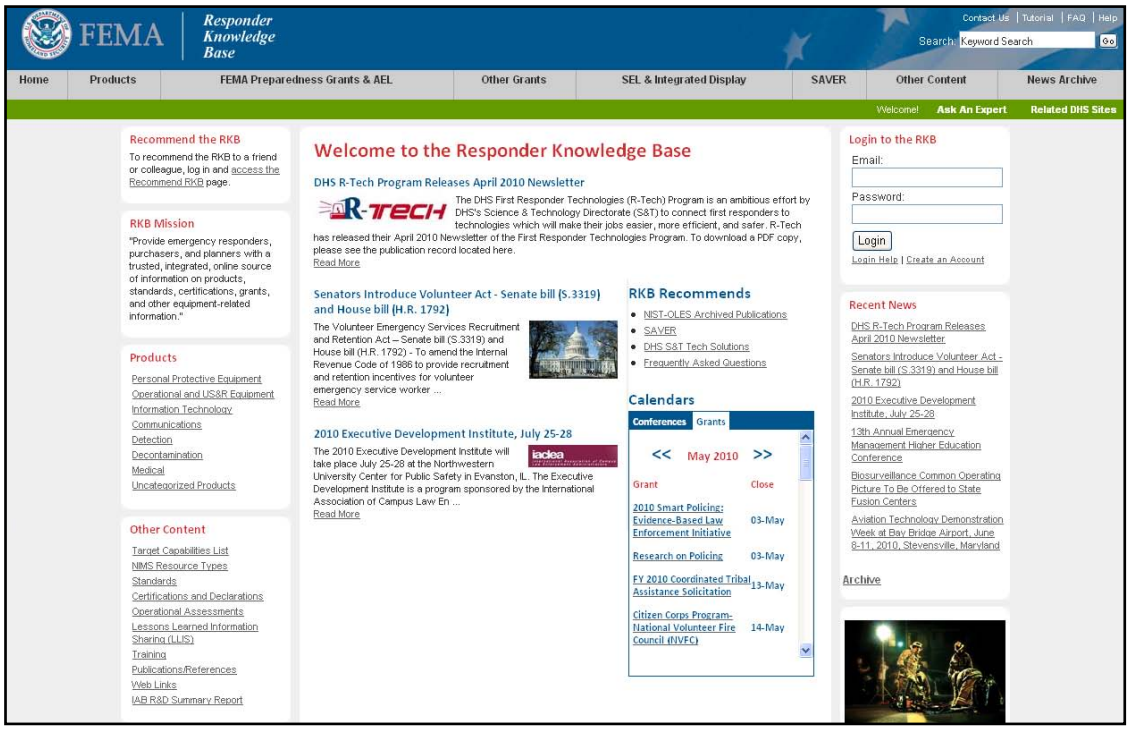
Co-located on the homepage with the conferences calendar, the grants calendar is organized by monthly application deadlines for grants. For example, all June 2010 grants are listed in order of application due date, starting with those due first. Clicking on the link for a specific grant directs the user to a Webpage that includes a grant description and objective, as well as deadlines, eligibility, and contact information. Links to the full grant solicitation, the hosting organization, and the grant application Website also are provided.

Organizing the grants by month will help first responders who lack staff researchers and grant writers to more quickly and easily find open grants. It also will help dedicated grant researchers to better determine grant release history and analyze grant cycles.

RKB provides information on grants from several agencies, including the Federal Emergency Management Agency, the Environmental Protection Agency, the Department of Justice, and the Department of Transportation. RKB itself does not oversee or provide funding for grants, but instead serves as a grant information repository.

The calendar does not display information for ongoing grants. All ongoing grants can be retrieved by clicking on either the "FEMA Preparedness Grants & AEL" grey tab or the "Other Grants" grey tab at the top of the RKB homepage. Users can use the Watch List feature in "My RKB" to be notified when grant records are added to the RKB Website.

To submit feedback on the grants calendar and other sections of the site, please visit the RKB's feedback link. For more information, e-mail RKB at RKBMailbox@us.saic.com or call 1-877-FEMA-RKB (1-877-336-2752).



The Responder Knowledge Base calendar lists grants in order of application deadlines. Image courtesy of RKB.